

# INSTRUCTION MANUAL



KEPCO, INC

**MRW 145KV**

## SWITCHING POWER SUPPLY

Kepeco Model MRW 145KV is a PC card style, dual-output switching power supply. The Kepeco MRW 145KV Power Supply can be operated with universal ac and dc power sources (90-264 Vac or 130-370 Vdc). The DC output power is shared between two outputs, +5V and +12V. Units feature isolated input and output. They are UL 1950 (50°C) Recognized, Certified to CSA C22-2 No. 234 level 3 (50°C) and TÜV (Rheinland) EN60950 (50°C) Approved. EMI meets both FCC Class B and VDE 0871 Class B (10KHz-30MHz). The 5V output is provided with overvoltage protection. When voltage across the 5V terminal exceeds the overvoltage limit range of 5.8V-6.9V, all outputs are shut down.

The power supply is self contained on a PC card and all components are within a 1.4-inch profile. A steel cover (Model CA-32) is available as an option. Kepeco supplies an optional Mating Connector Cable KIT 219-0257 for all output and input connections.

### OUTPUT SPECIFICATIONS

SPECIFICATION	OUTPUT #1	OUTPUT #2	CONDITION
Output Voltage	+5V	+12V	Factory set, nom input, typ load, 25°C
Initial Setting	5.00V ±20mV	-	100 Vac, typ load, 25°C, V1=2.0A, V2=1.5A
Adjustment <sup>(1)</sup> Range	+5% to -5%	-	115 Vac, typ load, 25°C
Output Current <sup>(3)</sup> Amps (See Figure 1)	0.5-2.0 (typ)	0.3-1.5 (typ.)	0-50°C
Output Power (Watts maximum)	28.0		40°C
	28.0		50°C
	19.6		60°C
	11.2		71°C
Ripple: <sup>(2)</sup>	80	120	Nom. input, typ. load
Noise <sup>(2)</sup>	150	290	dc to 20 MHz
Efficiency	73% typ		Nom. input, typ. load
Source Effect	1.0% max	1.5% max.	90-132Vac or 180-264Vac, typ load, 25°C
Load Effect <sup>(3)</sup>	2.0% max.	3.0% max	min. - typ load
Cross Effect (maximum)	Output #1 V1: min to typ V2 @ 1.5A	-	Load change from minimum to typical; nominal input, 25°C, other outputs at typical load
	Output #2 V2: min to typ V1 @ 2.0A	3.0%	
Temperature Effect	2.0% max.	3.0% max	Nom. input, typ. load, 0-50°C
Time Effect	0.5% max		Nom. input, typ. load, 25°C, 0.5-8.5 hr drift
Combined Effect: source, load, and temperature	+4.0%, -3.0%	±5.0%	Initial Setting 5.00V ±20mV
Recovery Characteristics	Excursion	4% max	
	Recovery (within ±1%)	1.0 msec max	
Overvoltage Protection	5.8-6.9V <sup>(4)</sup>	-	V1 only
Overcurrent Protection (minimum)	Total maximum output power limit 28 Watts, 40 Watts peak @ 50°C (see Figure 3)		Nominal input, 40°C

<sup>(1)</sup> Output #2 follows the adjustment of output #1 <sup>(2)</sup> mV p-p max. <sup>(3)</sup> When V2 load current exceeds 1.5 Amps, it must not continue for more than 3 seconds and the effective current must be less than 1.5 amps (see Figure 1).

<sup>(4)</sup> All outputs are shut down when OVP is activated.

## GENERAL SPECIFICATIONS

SPECIFICATION	RATING/DESCRIPTION	CONDITION
Temperature	0-71°C (derate output power linearly to 40% at +71°C)	Operating
	-40°C to 75°C	Storage
Humidity	95% RH	Non-condensing
Shock	60g 3 axes (11 msec ±5 msec pulse duration)	Non-Operating 3 shocks each axis
Vibration	5-10Hz: 10mm 10-55Hz: 2G, sinusoidal vibration in each of 3 axes for 1 hour	Non-Operating
Isolation (25°C, 65% RH)	500 Vdc, >100MΩ	Between input and output, output and ground, input and ground
Withstand Voltage (25°C, 65% RH)	2K Vac for 1 min	Input to output and input to ground
	3.0K Vac, 1 min. with Y capacitors removed	Input to output
Dimensions	1.97 x 7.87 x 1.40	inches
	50 x 200 x 35.6	mm
Weight	10.58	ounces
	300	grams
Mounting	see Mechanical Outline Drawing	
Safety	UL 1950 (50°C) Recognized, CSA C22.2 No. 234 Level 3 (50°C) Certified. EN 60950 (50°C) Approved by TÜV Rheinland	
Enclosure	Optional metal cover CA32 (see Mechanical Outline Drawing)	
Type of Construction	PC card	
Warranty	1 year	Used within ratings

## INPUT CHARACTERISTICS

SPECIFICATION	RATING/DESCRIPTION	CONDITION
Nominal Voltage	115, 230 Vac	
Voltage Range	90-264 Vac, 130-370 Vdc	
Current (maximum)	0.8A <sub>rms</sub> , 1.2A <sub>rms</sub> Peak Power	100-120 Vac, typ load
	0.5A <sub>rms</sub> , 0.8A <sub>rms</sub> Peak Power	200-240 Vac, typ load
Frequency	50-60 Hz (47-66 Hz)	Single Phase
Fuse Value	2.0A, 250 Volts	
Switching Frequency	~100 KHz typ	Nominal input, typical load
Brownout Voltage	85 Vac	typical load
Initial turn-on surge, first ½ cycle	50A peak (max)	100-120 Vac, rated load, (25°C cold start)
	100A peak (max.)	200-240 Vac, rated load (25°C cold start)
EMI	FCC Class B, VDE 0871 Class B	Conducted
Leakage current	0.5mA (max)	25°C, 100-120 Vac (UL method)
	0.75mA (max)	25°C, 200-240 Vac (VDE method)
Startup time	750 msec (typ)	25°C, nominal input, typical load
Holdup time	15 msec (typ), 10 msec (min) 100 Vac 25 msec (typ), 20 msec (min) 120 Vac	25°C, typical load
Circuit type	Flyback	

**MRW 145KV OUTPUT POWER:** Total output power available from the Model MRW 145KV is 28 Watts at temperatures up to 50°C, peak power is 40 Watts @ 50°C. The load is distributed to each output. Each output has a different maximum value of current that may be drawn.

A feature of the MRW 145KV Power Supply is the ability to draw nearly full power from either of the two (+) rails. The current from one output can be balanced against the other output to meet power needs for each specific application. The

secondary output voltage starts to drop when the primary output's load is reduced below its minimum value (the stabilization of the secondary output is degraded).

**NOTE:** In all cases the maximum current from an individual output should not allow the total power to exceed 28 Watts, 40 Watts peak @ 50°C.

**Connector Types:** Refer to the Mechanical Outline Drawing of the MRW 145KV Power Supply (see Figure 4). Mating connector types for CP51, CP1 and CP2 are as follows:

MRW 145KV TERMINAL	HEADER	HOUSING (MATING)	CONTACT (MATING)
CP1 ( $\perp$ )	KYOSHIN 82200		FASTON TAB 250 SERIES
CP2 (INPUT)	MOLEX 5096-02C	5195-03	5194TL size AWG No. 18-No22,
CP51 (OUTPUT)	MOLEX 5045-06A	5102-08	5103PBTL or 5103TL size AWG No. 22

**Connector Cable Kit:** Kepco furnishes an optional connector cable kit with the connectors specified above. The kit may be ordered under Kepco Model KIT 219-0257. The connectors are provided with 1 meter length leads for trimming to desired lengths.

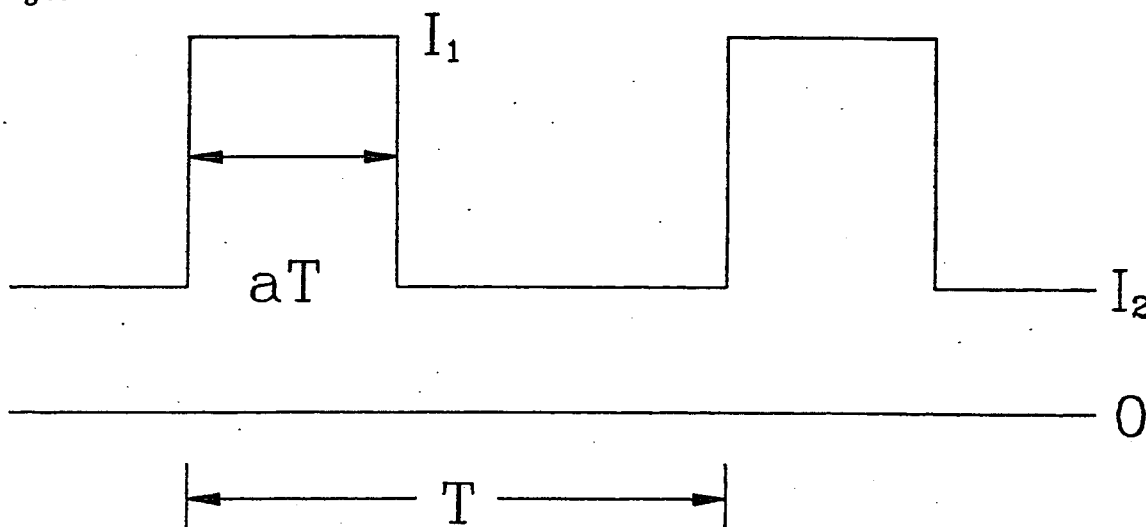


FIGURE 1 DETERMINATION OF THE EFFECTIVE OUTPUT CURRENT FOR THE MRW 145KV

**NOTE:** IF V2 LOAD CURRENT EXCEEDS 1.5 AMPS, THE TIME DURATION CANNOT EXCEED 3 SECONDS, AND THE EFFECTIVE LOAD CURRENT MUST BE LESS THAN 1.5 AMPS.  $aT \leq 3$ ;  $[aI_1^2 + (1-a)I_2^2]^{1/2} \leq 1.5$  AMPS

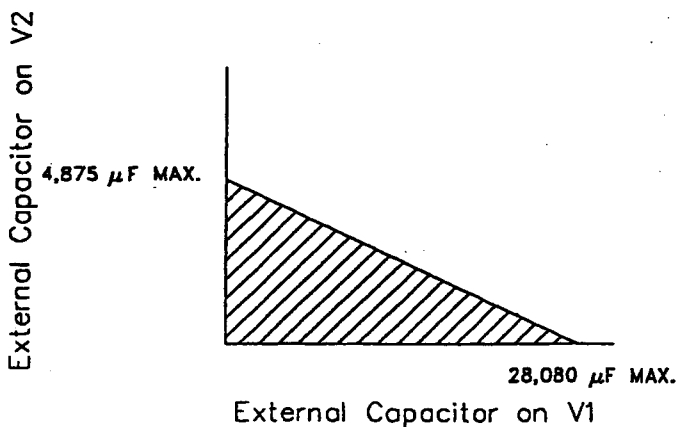


FIGURE 2 EXTERNAL CAPACITOR ON V1 VERSUS EXTERNAL CAPACITOR ON V2 FOR THE MRW 145KV POWER SUPPLY (NOTE: FOR THE ABOVE GRAPH  $C_1V_1^2 + C_2V_2^2 \leq 702000 \mu FV^2$ )

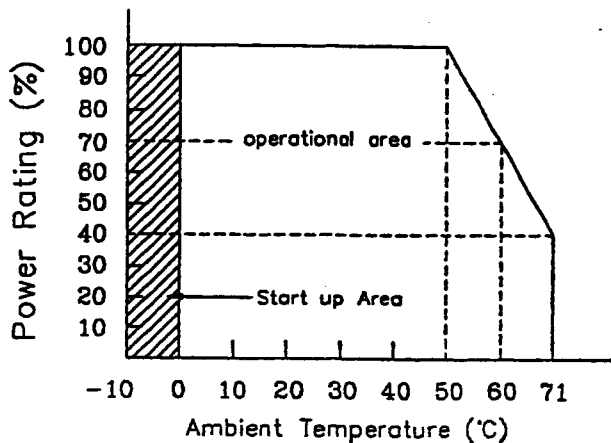
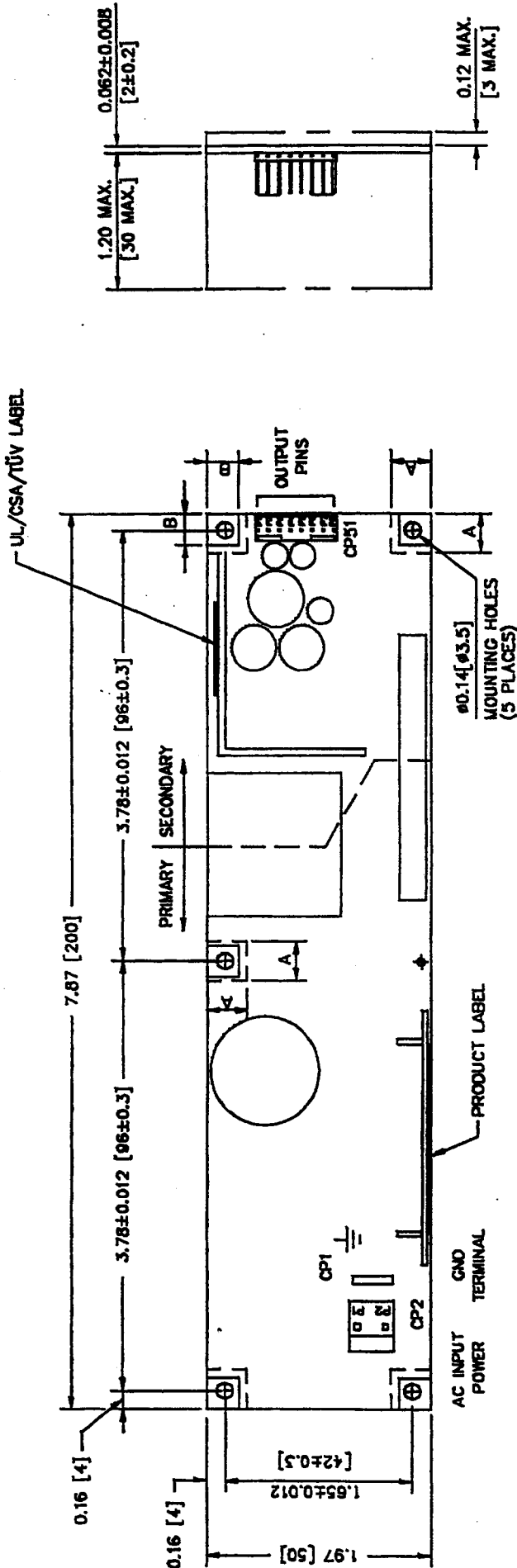


FIGURE 3 POWER RATING VERSUS AMBIENT TEMPERATURE FOR THE MRW 145KV



NOTES:

1. DIMENSIONS IN INCHES UNLESS OTHERWISE SPECIFIED; DIMENSIONS IN PARANTHESES ARE IN MILLIMETERS.
2.  $\pm 0.04$  [ $\pm 1$ ] TOLERANCE UNLESS OTHERWISE SPECIFIED.
3. "A": THE AREA FOR MOUNTING ON THE SOLDERING SIDE OF THE PC BOARD (5 PLACES) IS  $0.35 \times 0.35$  [9.0 X 9.0].
4. "B": THE AREA FOR MOUNTING ON THE PARTS SIDE OF THE PC BOARD (5 PLACES) IS  $0.28 \times 0.28$  [7.0 X 7.0].
5. FOR SAFETY COMPLIANCE, WHEN THE COVER AND MOUNTING BOARD ARE FABRICATED OF METAL, A SPACE OF MORE THAN 0.16 [4] FROM ANY COMPONENT OR LEAD IN THE PRIMARY CIRCUIT MUST BE PROVIDED.
6. MAXIMUM PENETRATION OF SCREWS FOR 0.14 [3.5] MOUNTING HOLES NOT MORE THAN 0.19 [5.0] FROM FRAME SURFACE.

CP51	MRW 145KV
P8	+12 VOLTS
P7	+12 VOLTS
P6	COMMON
P5	COMMON
P4	+5 VOLTS
P3	+5 VOLTS
P2	COMMON
P1	COMMON

CP2	AC INPUT
P2	LINE
P1	NEUTRAL

CP1	INPUT
P1	FG

FIGURE 4 MECHANICAL OUTLINE DRAWING OF THE MRW 145KV POWER SUPPLY